

THE

**BCLDP LOW-LEVEL WASTE
CERTIFICATION PLAN**

FOR THE

**BATTELLE COLUMBUS LABORATORIES
DECOMMISSIONING PROJECT**

BATTELLE
505 King Avenue
Columbus, Ohio 43201



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BCLDP Low-Level Waste Certification Plan

1.0 Purpose

The objective of the Battelle Columbus Laboratories Decommissioning Project (BCLDP) Low-Level Waste Certification Plan is to ensure that Contact Handled Low Level Waste (CH-LLW) and Remote Handled-Low Level Waste (RH-LLW) generated during Decontamination and Decommissioning (D&D) activities meet the compliance requirements and acceptance criteria established by the Envirocare of Utah and/or Hanford Waste Acceptance Criteria, respectively.

2.0 Scope

The LLW Certification Plan, as described herein, applies to only that waste that is generated in/or is the responsibility of the Department of Energy, and administered as part of the Battelle Columbus Laboratory Decommissioning Project (BCLDP). The scope of this plan is derived from the requirements found in the latest version of "Hanford Site Solid Waste Acceptance Criteria" (HNF-EP-0063) which goes into effect October 1, 1998 and (WHC-EP-0063-4) which is valid through September 30, 1998. All waste is to be handled, packaged, and shipped in accordance with BCLDP's Plans and Procedures.

3.0 References and Definitions

3.1 References

- 3.1.1 HNF-EP-0063 "Hanford Site Solid Waste Acceptance Criteria" (Valid as of October 1, 1998)
- 3.1.2 49 CFR, Parts 100-178 "Department of Transportation"
- 3.1.3 BCLDP-90-2, "Waste Minimization & Pollution Prevention Awareness Plan"
- 3.1.4 WA-OP-033, "Sampling of Waste Materials for Chemical and/or Radiological Characterization"
- 3.1.5 DD-MN-01, Quality Manual, D&D Operations
- 3.1.6 10 CFR, Part 71, Subpart H "Packaging and Transportation of Radioactive Material Quality Assurance"
- 3.1.7 10 CFR 50, Appendix B "Quality Assurance Criteria For Nuclear Power Plants and Fuel Reprocessing Plants"
- 3.1.8 Envirocare of Utah Customer Information Manual

- 3.1.9 WA-OP-020" Identification, Segregation, Separation, And Documentation Of Low Level And Radioactive Mixed Waste"
- 3.1.10 SW-846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
- 3.1.11 ANSI/ASME NQA-1 "Quality Assurance Program Requirements for Nuclear Facilities"
- 3.1.12 DOE Order 5700.6C "Quality Assurance"
- 3.1.13 WHC-EP-0063-4 "Hanford Site Solid Waste Acceptance Criteria " (Valid through September 30,1998)
- 3.1.14 WAC 173 - 303 "Washington Administrative Code"
- 3.1.15 DD-98-04 "Waste Characterization and Shipping Curie Conversions For Battelle Columbus West Jefferson North Facility"

3.2 Definitions

- 3.2.1 Compactible Waste - Low-level radioactive waste that is acceptable for super-compaction at GTS Duratek.
- 3.2.2 Excepted Packaging - Excepted Packages for limited quantities of radioactive material must meet the general design criteria of 49 CFR 173.410, which is less than the vigorous design criteria for specification packaging.
- 3.2.3 Homogenous Waste - Waste that is uniformly dispersed and having uniform composition.
- 3.2.4 Industrial Packaging - Packaging that, together with its low specific activity (LSA) material or surface contaminated object (SCO) contents, meets the requirements of 49 CFR 173.410 and 173.411.
- 3.2.5 Transuranic Waste - See Def. In WA-OP-020, 3.2.18.
- 3.2.6 Dry Active Waste - Low-level radioactive waste that does not contain any liquid. DAW includes rubber, plastic, cloth, wood and metal.
- 3.2.7 RCRA - Resource Conservation and Recovery Act.
- 3.2.8 TSCA - Toxic Substances Control Act.
- 3.2.9 SWAC - Site Waste Acceptance Criteria. Specifies a Treatment Storage and Disposal Facilities (TSDF) requirements for accepting, storing, treating, and/or disposing of waste.

- 3.2.10 Low Level Waste - Non-Transuranic (TRU) radioactive waste, that is the total activity of TRU isotopes less than or equal to 100 nCi/g and radioactive isotope concentrations which exceed the BCLDP radiological free release criteria.
- 3.2.11 WAC 173 - 303 - Washington State Administrative Code. Washington State Dangerous Waste. This document identifies certain materials that are considered dangerous waste according to the state of Washington.

4.0 **Background**

4.1 **Facility Description**

On April 16, 1943, Battelle Memorial Institute (BMI) entered into Contract No. W-7405-ENG-92 with the Manhattan Engineering District to perform atomic energy research and development activities. Since that time, Battelle has continuously performed research and development work under the contract at its facilities for the Department of Energy and its predecessor agencies. For the purposes of this Plan, Battelle Memorial Institute (BMI) is comprised of 15 buildings or portions thereof. Nine of these buildings are located at BMI's Battelle Columbus Operations (BCO), 505 King Avenue, Columbus, Ohio, while six of these buildings are at BMI's West Jefferson site, 1435 Plain City-Georgesville Rd., West Jefferson, Ohio. These facilities containing residual radioactive material resulting from the performance of work under the Government contract and for commercial clients are to be decontaminated and released to Battelle under the Department of Energy's (DOE's) Surplus Facilities Management Program (SFMP). The buildings and associated grounds are owned by Battelle and the facility maintains an active Nuclear Regulatory Commission (NRC) license.

The Government is contractually obligated to remove the radioactive waste and contamination resulting from its activities and to return these facilities to Battelle in a condition suitable for use without any radiological restrictions. These obligations and the principal requirements for the environmental restoration of Battelle's facilities are derived from the Atomic Energy Act (AEA) and a long-standing contractual commitment (Contract No. W-7405-ENG-92). These D&D activities are further subject to requirements derived from various DOE Orders, National Environmental Policy Act (NEPA), and various other Federal, state, and local laws and regulations. DOE has selected Battelle as its prime contractor to perform these D&D activities necessary to meet these obligations. The cost of the D&D effort called Battelle Columbus Decommissioning Project (BCLDP) and is a shared financial responsibility between Battelle (10%) and DOE (90%).

The type and extent of residual radioactive materials varies from facility to facility depending on the nuclear work performed. Most of the residual radioactive material at the King Avenue Site, for example, is due to uranium, thorium, and associated daughter products. Transuranic (TRU) material, mixed fission products, and activation products exist in three buildings in the Nuclear Sciences Area at the north end of the West Jefferson Site.

4.2 Facility Waste Management Strategy

The BCLDP will generate substantial volumes of LLW and TRU waste as well as small amounts of Radioactive Mixed Waste (RMW) as a result of D&D activities. These wastes will be minimized by volume reduction practices through decontamination systems and supercompaction of dry active waste.

To support waste minimization, volume reduction and waste characterization, waste forms will be segregated. Waste forms such as compactable, non-compactable and metal will be inventoried and placed into the proper containers for disposal or volume reduction. Segregated waste forms will also support waste characterization activities to enable reliable waste certification. Based upon characterization, data waste forms will be certified as to radioactive isotope, chemical or physical form, and hazardous constituents. The waste characterization data, waste forms will also classify waste as LLW, RMW, or TRU. An accurate characterization and certification process will support disposal and transportation requirements.

Waste generated by the BCLDP will be packaged to meet Hanford Waste Acceptance Criteria (WAC), Envirocare of Utah WAC and Department of Transportation (DOT) regulations 49CFR, Parts 100-178. The BCLDP will contract with DOT licensed carriers to provide transportation services for D&D waste materials.

To support waste minimization and volume reduction, the BCLDP may use contractors to provide these services. Contractors will be required to formally demonstrate their ability to process BCLDP waste and provide credentials and applicable licenses for services provided.

BCLDP Waste Management activities will be subject to the Quality requirements of the project. Oversight of waste characterization and certification activities will be provided by Waste Management and independent groups inside BCLDP's line organization. Waste Management oversees subcontractors providing volume reduction and waste minimization services will be required to provide formal quality plans and procedures to the BCLDP.

4.3 Facility Organization

- 4.3.1 BCLDP is organized into seven functional groups directly reporting to the Project Manager and five groups indirectly reporting as shown on the following Organization Chart. Note: The most current copy of the Organization Chart can be found in the office of the Program Manager Decontamination and Decommissioning. The seven functional groups within the BCLDP are:
 - 4.3.1.1 Radioanalytical Lab Operations
 - 4.3.1.2 Training & Records Management
 - 4.3.1.3 Remedial Action
 - 4.3.1.4 Characterization
 - 4.3.1.5 ES&H
 - 4.3.1.6 Project Administration Control
 - 4.3.1.7 Regulatory Compliance and Environmental Safety and Health Oversight

The Quality, Contracts, Procurement, Institutional Relations and Legal support groups report indirectly to the D&D Program Manager.

5.0 Certification Methodology

5.1 Requirements

BCLDP's plan for LLW Certification is designed to assure that all waste from BCLDP meets the waste acceptance criteria for the Envirocare of Utah, Inc., Hanford Site 200 Areas Storage and Disposal Facilities. This criteria is presented in the latest version of "Hanford Site Solid Waste Acceptance Criteria" (HFN-EP-0063) and Envirocare of Utah Customer Information Manual, respectively. Plans are in place to cover the various phases of D&D operations. Procedures address health and safety concerns, waste reduction, characterization and segregation by radionuclide concentration, physical and chemical properties, and waste handling and packaging.

5.2 Waste Reduction Methodology

Waste reduction is covered in BCLDP-90-2, "Waste Minimization And Pollution Prevention Awareness Plan". BCLDP's management team is firmly committed to minimizing the amount and volume of waste generated in D&D activities. BCLDP waste reduction activities includes source reduction, free release, product substitution, recycling, and volume reduction.

- 5.2.1 Source Reduction: Materials and equipment removed under D&D activities are surveyed extensively for residual contamination. This surveying and decontamination of material is a very large part of the D&D operation. Items are either released for unrestricted use, decontaminated and then released, or disposed of as radioactive waste. Contaminated items are decontaminated, if practical and economical, and resurveyed for free release. The process of free release is strictly

controlled and documented. Decontamination and free release of items has significantly reduced the volume of waste disposed of as radioactive.

- 5.2.2 Product Substitution: Substituting Hanford approved nonhazardous products for regulated solvents during the decontamination stage has strengthened the certification process, insuring that BCLDP is not generating RMW unnecessarily.
- 5.2.3 Recycling: With BCLDP's successful decontamination program and free release certification, BCLDP is able to reuse equipment, tools, supplies, and products that are very costly to dispose of and/or replace. BCLDP has been very successful in releasing steel, aluminum, copper, and other metals that can be recycled. Recycling volumes for the BCLDP are documented in the annual report of Waste Generation and Waste Minimization Progress submitted to DOE.
- 5.2.4 Volume Reduction: Volume reduction is significantly enhanced by the use of a BCLDP Quality approved vendor, for example GTS Duratek (GTS) Bear Creek Division, Oakridge, TN. GTS is a Hanford- and DOE-approved processing facility for Battelle. GTS has impressive reduction capabilities including incineration for combustible waste, supercompaction using a 500,000 ton compactor for noncombustible waste and metal smelting for contaminated metals and equipment. The metal smelting process does not only reduce volume but the finished product becomes metal block used for shielding. The blocks are a product that will be used in future DOE projects.

5.3 Waste Segregation Methodology

Waste is segregated into four waste designation groups: LLW, RMW, TRU, and TRU mixed waste. The wastes are segregated further in each designation group as shown below.

- 5.3.1 TRU and TRU Mixed Waste: TRU and TRU mixed waste are segregated from LLW and RMW but are not addressed in this document.
- 5.3.2 RMW Segregation: RMW will be segregated by chemical compatibility and stored in accordance with all applicable state, local and federal regulations. In cases where in-situ chemical characterization indicate a probability of RMW generation for a D&D task, specific instructions for sorting, segregating and packaging are issued by BCLDP Waste Management as an attachment to the job task work instruction. These instructions are based upon the chemical characteristics and the WAC of the designated treatment, storage and disposal facility (TSDF) WAC. Currently, the BCLDP has only one RMW stream authorized for shipment to Hanford under the Federal Facilities Compliance Act (FFCA).
- 5.3.3 LLW Segregation: LLW is inventoried and segregated at the point of generation into four waste streams: compactible, noncompactible, soil and metals. The waste is then packaged for shipment directly to Envirocare, Hanford or GTS for further waste reduction before shipment to Hanford. All waste shipped directly to Hanford will be noncompactible, metal, or processed compacted "pucks" packaged in excepted

packaging or Type A drums and boxes under an approved Waste Characterization Summary Profile.

Waste shipped to GTS for waste processing will be inventoried, segregated, and loaded into GTS sealand containers or GTS daughter (D) boxes. It is BCLDP's policy to do a 100% verification of LLW not containing hot particles to insure compliance to their procedures and policies. A representative from BCLDP Waste Management will observe the processing and packaging of BCLDP waste for verification purposes at the GTS facility. Wastes designated for shipment to Envirocare of Utah are packaged in excepted packaging or 40 ft³ soil bags. Procedures are in place to ensure compliance with Envirocare WAC and the appropriate Radioactive Waste Profile Record.

5.4 Radionuclide Characterization Methodology

Radiological characterization of BCLDP wastes shall be executed utilizing one or more of the methods described below to permit proper identification, classification, segregation, transportation, treatment, storage and disposal. The concentration of radionuclides in the waste matrix will be determined by direct methods or indirect methods using scaling factors that relate the inferred concentration of one radionuclide to another that is measured. Indirect methods used to determine radionuclide concentration will be supported by sampling and analysis or other means of validation.

- 5.4.1 Radiological Concentrations: Radiological segregation is defined in HFN-EP-0063 and starts with segregation of TRU waste from LLW. LLW is then further segregated into three waste categories:

Waste Category 1 --	Low Activity
Waste Category 3 --	Moderate Activity
Greater than Waste Category 3 --	High Activity

These concentrations of radionuclides may be determined by direct or indirect methods.

- 5.4.2 Direct Sampling of Homogenous Waste Streams: Representative samples shall be collected from homogenous wastes such as sludge, soil, and incinerator ash in accordance with procedure WA-OP-033, "Sampling of Waste Materials for Chemical and/or Radiological Characterization" that complies with SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods". Specifications for isotopic analysis shall be based on qualitative knowledge of the source.
- 5.4.3 Dose-to-Curie Calculations: The analysis of heterogeneous wastes, such as dry solid trash or scrap materials, do not lend themselves to direct sampling and analysis as described for homogeneous wastes above. For this reason DD-98-04 will use a curie content determination based on the radiation field emanating from the package. The dose rate of the package will be used in conjunction with the qualitative process knowledge of the radionuclides present in the waste matrix to estimate the curie

content based on established dose-to-curie conversion factors and adjusted periodically for radioactive isotope decay. Periodic verification of this methodology will be performed through sampling and isotopic analysis.

- 5.4.4 Non-Destructive Assay of Packaged Waste: Classification of 55-gallon drums or metal boxes containing LLW wastes from the West Jefferson facilities may be analyzed by non-destructive assay in place of, or in addition to, direct sampling or radiation field measurements. Gamma-ray histograms are collected using a high resolution intrinsic germanium detector and Multi-Channel Analyzer (MCA) emulation software specific. Activities of the gamma-ray emitting radionuclides are then calculated. Real-time Radiography (RTR) may also be utilized in part to determine the physical inventory of the drum. These tasks will be performed by a vendor with mobile equipment.

5.5 Chemical Characterization Methodology

BCLDP prevents or minimizes the generation of RMW waste in three different ways; pre-job walk-downs for hazardous material identification; in-situ sampling; and product control. Hazardous materials are designated by process knowledge (use of a Material Safety Data Sheet [MSDS]) or analytical verification by a BCLDP-approved laboratory. Any waste determined through process knowledge or analytical sampling to contain hazardous constituents exceeding regulatory limits are placed in <90 day or satellite accumulation area (SAA).

- 5.5.1 Pre-Job Walk-Down: A pre job walk-down for hazardous material is conducted by BCLDP staff members trained in identifying all known or suspected hazardous materials regulated by RCRA, TSCA, and/or WAC 173-303. Only when all regulated materials have been identified and/or removed, can D&D activities be permitted to start.
- 5.5.2 In-situ Sampling: Areas of facilities slated for D&D that carry a higher probability of chemical contamination (drain traps, sumps) are sampled well before D&D takes place to minimize the potential of cross-contamination of a LLW stream with RMW.
- 5.5.3 Product Control And Substitution: Waste Management provides the decontamination personnel with a list of Hanford approved nonhazardous products for decontamination. This list is updated with Hanford's Solid Waste Engineering on a regular basis to insure BCLDP's compliance. These approved products are the only ones that can or will be used for decontamination.

5.6 Waste Handling and Packaging Methodology

All LLW is inventoried and packaged in plastic bags or plastic wrap at the point of generation. The waste is then directly packaged into excepted packaging or moved to a staging area for final packaging. Non-compactible waste that will be shipped directly to Hanford will be packaged into DOT-approved B-25 metal boxes. BCLDP will use a Hanford-approved void space filler reducing the void space to less than 10% (primarily foam). Dry-active waste that will be sent to GTS Duratek for volume reduction will be loaded into sea-land containers and shipped to GTS Duratek for further waste processing. It is the policy of GTS Duratek to inspect, sort, and segregate all non-hot particle dry-active waste before it is processed. This waste will then be processed, sampled, and packaged to an approved Hanford Waste Generation Summary Profile before being shipped to Hanford. Waste that is to be sent to Envirocare will be packaged according to the Envirocare "WAC" and staged until such time that a shipment can be made.

The LLW designated for disposal at the Hanford site has been or will be packaged in HNF DOT 7A Type A containers or excepted packaging conforming to 49CFR DOT specifications and WHC-EP-0063 or HNF-EP-0063 (effective October 1, 1998) requirements. Should a waste meet the criteria specified for Type A quantities, a DOT specification 7A Type A package will be used.

5.6.1 Unforeseen Waste

Unforeseen waste will be properly characterized for its radiological, chemical, and physical characteristics in accordance with this section. For all unforeseen waste streams, new waste characterization summary profiles will be developed and submitted to the appropriate disposal facility.

6.0 Quality Assurance/Quality Control

- 6.1 The Quality Organization is responsible for assessing and enhancing the quality of BCLDP activities and outputs by ensuring that they are performed according to predetermined quality standards. These responsibilities include:
 - 6.1.1 Preparing and updating the BCLDP Quality Plan and Procedures.
 - 6.1.2 Identifying quality problems, recommending solutions, verifying implementation and assuring the resolution of nonconforming conditions.
 - 6.1.3 Assisting the Program Manager, Building Group Project Managers, and Group Managers in identifying and preparing quality related subcontract requirements.
 - 6.1.4 Performing internal and subcontractor quality assessments, identifying root causes, recommending corrective actions, evaluating progress, and performing trend analyses.

6.1.5 Evaluating applicable quality requirements, regulations, standards, and guidelines to define applicability to the BCLDP.

6.1.6 Ensuring documentation is maintained for quality related activities.

6.2 Records

Maintenance of records and documents demonstrating compliance with certification criteria of radioactive LLW is a multidepartmental responsibility. Each department is responsible for ensuring records required by their activities are accurate, complete, and organized in an understandable manner. Quality assessments periodically verifies correct and effective accumulation of records.

Organization	Documentation
Radioanalytical Laboratory	Laboratory Analysis (as applicable)
Waste Management	Work Instructions
Waste Management	Standard Operating Procedures
Waste Management	Waste Certification Program and Plan
Waste Management	LLW and RMW Shipping Records
Health Physics	Radiological Survey Results of Waste Packages
Radiological Technical Support	Isotopic Analysis and Calculations of Isotopic Distribution
Health Physics, Quality	Related Memos and Letters
Waste Management, Health Physics, Quality, Training Departments	Training Records
Quality, Independent Oversight	Assessments, Audits, Surveillances, Inspections
Quality	Quality Plans
Quality	Non-conformance Reports
BCLDP Project Records	Record Storage

6.3 Quality Summary

The DD-MN-01, "Quality Manual, D&D Operations" sets policy and requirements for D&D activities. Battelle personnel who manage and conduct Decontamination and Decommissioning Operations (DDO) activities are responsible for attaining the project quality objectives as delineated in the quality policies, plans, procedures and instructions referenced in the DD-MN-01. The Quality Program applies to Battelle personnel involved in the performance of quality-affecting work.

The basic objective of the DDO Quality Program is to facilitate the implementation of current quality management requirements and principles and to assess work for effective implementation of these requirements and principles. The Quality Program is designed to accommodate activities depending upon their nature, risk, importance, scope, and the quality required of the end item deliverables, services, or activities.

The Quality Program has been developed to meet the quality requirements of Contract W 7405-ENG-92 including the basic requirements of ANSI/ASME NQA-1, "Quality Assurance Program Requirements for Nuclear Facilities." The Quality Program is intended to comply with requirements of Title 10 CFR 50, Appendix B and Title 10CFR Part 71, Subpart H. The DDO Quality Program also implements applicable portions of DOE Order 5700.6C, Quality Assurance.

The Battelle Quality Manager (QM) has the responsibility and authority for development, maintenance, and administration of the DDO Quality Program. The QM is also responsible for verification of compliance with the program requirements. The QM has the authority to recommend, initiate, and provide solutions to quality problems and issue stop-work orders. The QM also provides support to the Battelle staff in carrying out their D&D quality-affecting responsibilities.

The policies, requirements, and responsibilities contained in the program have the full endorsement and support of the Battelle Vice President for Quality.